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## (54) A SHAFT AND HUB ASSEMBLY

(71) We, ZAHNRADFABRIK FRIEDRICHS-  
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 Germany, a Joint-Stock Company organised  
 under the laws of the Federal Republic of  
 Germany, do hereby declare the invention,  
 for which we pray that a patent may be  
 granted to us, and the method by which it is  
 to be performed, to be particularly des-  
 cribed in and by the following statement:—

This invention relates to a shaft and hub  
 assembly including circlip means for secu-  
 ring said shaft and hub against relative  
 axial displacement in only one direction.

For axially securing a shaft-hub connec-  
 tion which rotates at high speed or is sub-  
 ject to shock loading it is known to use a  
 divided ring together with a bandage to pre-  
 vent the ring lifting-off radially out of its  
 groove. Such securing is complicated,  
 cumbersome, and comparatively expensive.

The invention aims at providing securing  
 means which makes it impossible for the  
 circlip to lift off radially. At the same time  
 said means should take up little space, and  
 should be inexpensive and easily fitted.

Accordingly, the present invention consi-  
 sts in a shaft and hub assembly including  
 circlip means for securing said shaft and hub  
 against relative axial displacement in only  
 one direction, wherein a first circlip is ac-  
 commodated in a groove in the shaft and  
 abuts a portion of an adjacent end face of  
 the hub, and a second circlip is accom-  
 modated in a groove in the bore of the hub  
 and surrounds said first circlip circumferen-  
 tially in a substantially common plane.

The invention makes it possible to pro-  
 vide a circlip fastener in a simple manner,  
 this being achieved by the use of the second  
 circlip which comes to lie over the first  
 circlip, the first circlip being supported on  
 the inside diameter of the second circlip by  
 its own force or by the action of a high rota-  
 tional speed. The grooves for the two circlips  
 may be formed in such a manner that for  
 assembly purposes the second circlip can  
 easily be inserted into its groove by passing  
 over the first circlip. This is achieved  
 through the fact that the groove for the first

circlip is made deeper than is normally the  
 case, so that on insertion of the second  
 circlip the first can penetrate into its groove  
 to the extent of the depth of the groove  
 of the second circlip.

In order that the invention may be more  
 readily understood, reference is made to  
 the accompanying drawings which illustrate  
 diagrammatically and by way of example  
 two embodiments thereof and in which:—

Fig. 1 is an axial view of a first embodi-  
 ment of a shaft and hub assembly in ac-  
 cordance with the invention,

Fig. 2 is a cross-section on the line II—II  
 of Fig. 1, showing the position of the circlips  
 when the shaft is stationary,

Fig. 3 is a cross-section through another  
 embodiment of a shaft and hub assembly in  
 accordance with the invention, showing the  
 position of the circlips,

Fig. 4 is a similar cross-section to that of  
 Fig. 3, with the outer circlip removed, and

Fig. 5 shows the insertion of the outer  
 circlip in the embodiment of the invention  
 shown in Figs. 3 and 4.

In the drawings the same references are  
 used for identical parts.

Reference numerals 1 and 2 indicate cir-  
 clips of known construction, for shafts or for  
 bores, which circlips are disposed in a sub-  
 stantially common plane one within the other  
 in their respective grooves 3 and 4 in a shaft  
 6 and in the hub 5 which is to be fastened on  
 the shaft. The circlips 3 abuts a portion of  
 an adjacent end face of the hub 5. In the  
 embodiment of Figs. 1 and 2, the grooves  
 and the cross-sections of the circlips are so  
 dimensioned that a gap substantially equal  
 to the depth of the hub-groove 4 is formed  
 between the two circlips when in their as-  
 sembled positions.

For assembly purposes the circlip 1 and  
 thereafter the circlip 2 are inserted in known  
 manner into their grooves. When the shaft  
 is then rotated at high speed and the circlip  
 1 tends to lift off radially, it will be able to  
 do so only to a slight extent and will then  
 bear against the circlip 2.

In the embodiment of the invention shown  
 in Figs. 3 to 5, the arrangement of the shaft

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and hub grooves 3 and 4 is the same as in the first embodiment. The difference is that instead of the circlip 1 lying against the bottom of the shaft groove 3, use is made of a circlip 7 which is of slightly larger diameter than the circlip 1 and which after being fitted in position comes to bear against the inner periphery of the circlip 2 (Fig. 3). The constant expanding and contracting, to which the inner circlip 1 is usually subjected, upon rotation of the shaft, is thereby avoided, so that its life can be lengthened. For assembly purposes the inner circlip 7 is first introduced (Fig. 4), and is then pressed into the depth of its groove 3 and at the same time the circlip 2 is pushed over it (Fig. 5). When the circlip 2 now engages in its groove 4, the circlip 1 will spring open until it bears against the inner periphery of the circlip 2 (Fig. 3).

WHAT WE CLAIM IS:—

1. A shaft and hub assembly including circlip means for securing said shaft and hub against relative axial displacement in only one direction, wherein a first circlip is accommodated in a groove in the shaft and abuts a portion of an adjacent end face of

the hub, and a second circlip is accommodated in a groove in the bore of the hub and surrounds said first circlip circumferentially in a substantially common plane.

2. An assembly as claimed in Claim 1, wherein the first circlip lies against the bottom of its groove, and wherein between the two circlips a gap is formed which is substantially equal to or is slightly larger than the depth of the bore groove.

3. An assembly as claimed in Claim 1, wherein the first circlip lies resiliently against the inside diameter of the second circlip, and wherein between the first circlip and the bottom of its groove a gap is provided which is substantially equal to or is slightly larger than the depth of the bore groove.

4. A shaft and hub assembly, substantially as herein described with reference to and as shown in the accompanying drawings.

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FIG. 2

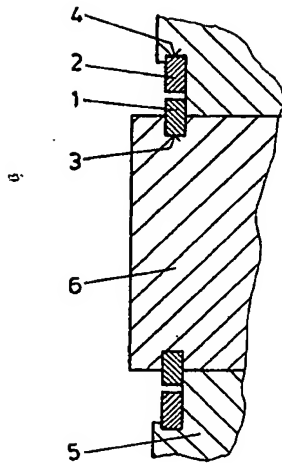


FIG. 1

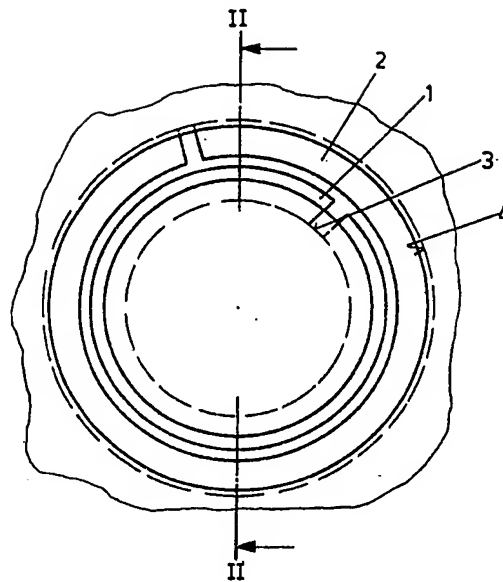


FIG. 3

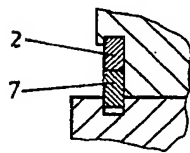


FIG. 4

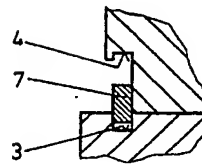
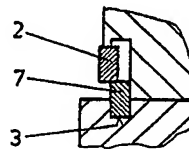


FIG. 5



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